WHAT IS CLAIMED IS:

1. A rotary electric machine comprising:

a rotor including a rotor core that alternately generates north and south poles in a circumferential direction and a field winding wound around the rotor core;

a stator including a stator core arranged opposite to the rotor core and a stator coil wound around the stator core; and

a frame supporting the rotor and the stator,

wherein magnetic coating made of magnetic particles and binding material binding the magnetic particle is formed on at least one of opposite surfaces of the stator and the rotor; and

wherein a tensile strength of the magnetic coating is set smaller than a bonding strength between the magnetic coating and a surface where the magnetic coating is formed.

2. The rotary electric machine of claim 1,

wherein the rotor includes a pair of rotor cores, each of which includes claw portions generating north and south poles and a boss portion having a rotor winding therearound;

wherein the pair of rotor cores forms a roundel-type core and is arranged opposite to each other at an end surface of the boss portion; and

wherein the magnetic coating is applied to at least one outer peripheral surface of the claw portions, the end surface of the boss portion and an inner peripheral surface of the stator core.

3. The rotary electric machine according to claim 1, wherein the rotor includes:

a first claw portion having a cylindrical shape and generating north and south poles;

a second claw portion holding the first claw portion through a non-magnetic member and connected to the rotary shaft;

a boss portion arranged at an inner peripheral side of the field winding and connected to the rotary shaft; and

a field winding holding portion holding the field winding and forming a magnetic circuit which connects the first claw portion and the boss portion, and

wherein the magnetic coating is applied to at least one outer peripheral surface of the first and the second claw portions, an inner peripheral surface of the first claw portion, an inner and an outer peripheral surface of the field winding holding portion and an inner peripheral surface of the stator core.

4. The rotary electric machine according to claim 1, wherein the binding material has lubricity.

5. The rotary electric machine according to claim 2, wherein the binding material has lubricity.

6. The rotary electric machine according to claim 3, wherein the binding material has lubricity.

7. The rotary electric machine according to claim 1, wherein the binding material is an insulating material.

8. The rotary electric machine according to claim 2, wherein the binding material is an insulating material.

9. The rotary electric machine according to claim 3, wherein the binding material is an insulating material.

10. The rotary electric machine according to claim 1, wherein the binding material contains a rust inhibitor.

11. The rotary electric machine according to claim 2, wherein the binding material contains a rust inhibitor.

12. The rotary electric machine according to claim 3, wherein the binding material contains a rust inhibitor.

13. An alternator for a vehicle, the alternator comprising:

a frame supporting a rotor and a stator;

wherein the frame has a front bracket and a rear bracket, the front and rear brackets securing the stator and the rotor therebetween;

wherein the rotor includes a rotation shaft, a core, a first pole, a second pole, a ring, a field core, a field winding bobbin, and a field winding;

wherein the stator includes a stator core, and a stator

coil;

wherein the field core and the core define a first air gap, the core and the pole define a second air gap, the pole and the stator define a third air gap, the stator and the pole further define the third air gap, and the pole and the field core define a fourth air gap; and

wherein a magnetic coating is applied on at least one of the field core or the core, which define the first air gap.

14. The alternator of claim 13,

wherein the magnetic coating is made of magnetic particles and a binding material to bind the magnetic particles.

15. The alternator of claim 14,

wherein a tensile strength of the magnetic coating is lower than a bonding strength between the magnetic coating and a surface to which the magnetic coating is applied.

16. The alternator of claim 15,

wherein the binding material is lubricious, to facilitate any potential contact between opposing surfaces of the air gaps when the air gaps are minimized.

17. The alternator of claim 16,

wherein the binding material is an insulating material and a rust inhibitor.

18. An alternator for generating electricity for a motor vehicle, the alternator comprising:

a rotor including a rotor core that alternately generates north and south poles in a circumferential direction and a field winding wound around the rotor core;

a stator including a stator core arranged opposite to the rotor core and a stator coil wound around the stator core; and

a frame supporting the rotor and the stator,

wherein a magnetic coating made of magnetic particles and a binding material binding the magnetic particles is formed on at least one of opposite surfaces of the stator and the rotor;

wherein a tensile strength of the magnetic coating is designed to be lower than a bonding strength between the magnetic coating and a surface where the magnetic coating is applied;

a first claw portion having a cylindrical shape and generating north and south poles;

a second claw portion holding the first claw portion through a non-magnetic member and connected to the rotary shaft;

a boss portion arranged at an inner peripheral side of the field winding and connected to the rotary shaft; and

a field winding holding portion holding the field winding and forming a magnetic circuit which connects the first claw portion and the boss portion, and

wherein the magnetic coating is applied to at least one outer peripheral surface of the first and the second claw

portions, an inner peripheral surface of the first claw portion, an inner and an outer peripheral surface of the field winding holding portion and an inner peripheral surface of the stator core;

wherein the binding material is lubricious;

wherein the binding material is an insulating material; and

wherein the binding material is a rust inhibitor.